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CONTAGIOUS CONJUNCTIVITIS.

CONTAGIOUS conjunctivitis, strictly speaking, embraces all the more acute forms of conjunctivitis, but in this paper I intend to treat more particularly of the group usually spoken of as purulent or blennorrheal conjunctivitis. In this group there are four principal classes; 1st, the acute catarrhal conjunctivitis, commonly called pink eye; 2d, ophthalmia neonatorum; 3d, gonorrhœal conjunctivitis; 4th, diphtheritic conjunctivitis.

Under these heads there have been grouped in the past four distinct clinical pictures, which may be briefly summarized as follows:

1st. Acute catarrhal conjunctivitis. A disease of the conjunctiva in which there is great congestion, some swelling of the lids, and more or less muco-purulent discharge. The cornea is rarely infiltrated and the disease runs its course in from eight days to three weeks. The eye upon recovery is unharmed.

2d. Ophthalmia neonatorum. A disease which appears within the first week of the child's life, being characterized by a profuse purulent or muco-purulent discharge with congestion of the conjunctiva and often very considerable œdematous swelling of the lids, the cornea often becoming infiltrated, necrotic, with sloughing of the corneal tissue, leaving dense, white cicatrices, which make the child blind for life. That this much to be deplored result occurs only too often is demonstrated by the fact that nearly 20% of

all the blind under twenty years of age become so from this cause.

3d. Gonorrhœal conjunctivitis. An acute disease produced by an infection with gonorrhœal pus, marked by great congestion of the conjunctiva. Œdematous swelling of the lids, often very great, and characterized by a profuse flow of creamy pus, yellow without mucus, which is sufficiently liquid to flow easily down the cheek upon the opening of the lids. The cornea generally becomes seriously infected, with sloughing of the corneal tissue, and perforation as a common result.

4th. Diphtheritic conjunctivitis. An acute disease marked as the previous ones have been by great congestion of the conjunctiva, which in the course of a few days is succeeded by a deep, grey, brown infiltration, which produces in the lids a brawny, inflexible condition, so that the upper lid apparently elongates and hangs over the lower lid down upon the cheek. This brawny, brown, grey infiltration also extends onto the conjunctiva of the eye to the margin of the cornea. There is no discharge except some lachrymation in which are occasional flakes of false membrame. The cornea soon becomes necrotic, sloughs, and the eye is lost.

The above descriptions have been classical for years, but in the light of modern bacteriology must be modified very considerably, and a new nomenclature which follows the bacteriological findings, must be adopted. Such a classification of purulent ophthalmias would place some cases, which from the above description would be classed as gonorrhœal, under the head of diphtheritic conjunctivitis, and some cases which would formerly have been classed as acute catarrhal conjunctivitis prove to be gonorrhœal, and so on. In all cases this scientific accuracy of diagnosis may not be of importance, but in others the safety of the eye depends upon an early and accurate determination of

the micro-organism present. I have, with the assistance of Dr. William Daly, made an investigation of all acute cases of conjunctivitis coming on my last two services at the Massachusetts Charitable Eye and Ear Imfirmary, and this paper is a summary of the result of that investigation.

The first thing to be noted is that the disease known as acute catarrhal conjunctivitis is in reality a group of a number of mild infections often produced, it is true, by a bacillus, which has been described by Dr. Weeks of New York; nevertheless, it may apparently also arise from an infection with the pneumococcus, staphylococcus, streptococcus, and perhaps by other micro-organisms, not excluding an infection with gonococcus, which may run so mild a course as to be mistaken for some of the other infections, although such instances are rare. A bacteriological investigation of ophthalmia neonatorum shows that almost all the cases which run a destructive course are due to an infection with gonococci, although within a few weeks I have seen a case in which a purulent conjunctivitis, originating within the first week of life, was due to an infection with Klebs-Lœffler bacilli. The lighter cases of this disease have in my experience proved to be due to an infection with pneumococci. The fact that the majority of these cases are gonorrhœal has made the success of the Credè method for the prevention of this disease.

In cases which present the clinical pictures of diphtheritic and gonorrhœal conjunctivitis, experience has proved that bacteriological examinations are of the very greatest value, for many cases, which from the clinical picture we have supposed to be gonorrhœal are, in reality, diphtheritic and the converse is also true to some extent, as I have seen brawny aud infiltrated lids, dense infiltration of the bulbar conjunctiva with necrotic condition of the cornea and very slight, if any, purulent discharge, which upon bacteriological investigation proved to be infections from gonococci.

From the standpoint of therapeutics, it is of greatest importance that a proper bacteriological diagnosis should be made in these cases and that from this examination the line of treatment should be decided, and not from the clinical appearance of the eye. The importance of this early diagnosis is, to my mind, due to the fact that in gonorrhœal ophthalmia nitrate of silver is the only application which ever controls the disease, while in diphtheritic conjunctivitis I consider that nitrate of silver hastens the destructive process which is taking place in the corneal tissue. Conversely, it is my opinion that the diphtheritic condition of the conjunctiva and consequent necrosis of the cornea will generally be controlled by prompt and persistent use of antitoxine.

After these infections of the conjunctiva, the next most dangerous form of contagious conjunctivitis is the so-called granular lids or trachoma; if this is of bacterial origin the micro-organism has not as yet been recognized, nevertheless it will spread slowly through an orphan asylum, tenement house, or any other place where the poor are crowded together, unless special means are taken to prevent this result, leaving its victims handicapped for life and often nearly blind. Fortunately it is diminishing in this country and is, compared with a few years ago, seldom seen except among recent immigrants from the eastern end of the Mediterranean, Polish and Russian Jews, Armenians and others from that locality, and I may say in passing that the presence of acute trachoma in the conjunctiva of immigrants should be a good and sufficient reason for turning them back whence they came. A large proportion of these cases within a few months after their arrival become incapacitated and are public charges. And not only this, but were it not for the new cases thus introduced into the great tenement localities of our large cities, it is my opinion that the disease would soon become extremely rare in this part of the country.

From my experience in cases of purulent conjunctivitis and trachoma, I arrive at the following conclusions:

1st. That in all cases of purulent conjunctivitis, the diagnosis should be made by the bacteriological examination and not from the clinical picture.

2d. That in the two most dangerous diseases of this class, viz: gonorrhœal conjunctivitis and diphtheritic conjunctivitis, a favorable outcome of the case depends upon a correct diagnosis, as proper treatment in one disease is of no benefit in the other and may even do harm.

3d. That in cases of ophthalmia neonatorum a bacteriological diagnosis is as important as in other cases of purulent conjunctivitis, and if such were made early and prompt treatment instituted, many a child would be saved from blindness.

4th. That in every case in which a parturient woman has a leucorrhœa, if it is not convenient to bacteriologically determine the cause before the birth of the child, Credè's method should invariably be employed.

5th. Immigrants with acute trachoma should not be admitted to this country.

PURULENT OPHTHALMIA FROM THE BACTERIOLOGICAL STANDPOINT.

The importance of an early bacteriological examination in purulent conditions of the conjunctiva has already been pointed out. The clinical picture in such conditions is oftentimes, it may be said in the majority of cases, of no value in helping us to determine the ætiological factor, it being absolutely impossible in some cases to distinguish clinically in the beginning between

Acute contagious conjunctivitis,
Diphtheritic conjunctivitis,
Pneumococcus conjunctivitis,
Membranous conjunctivitis, not due to the presence of the Klebs-Lœffler bacillus.

Another class of purulent cases in which the differential diagnosis without microscopical examination is one of great difficulty is that offered by the infants seen for the most part in out-patient departments of large hospitals. Here is to be made a differential diagnosis between

Gonorrhœal ophthalmia,
Tear sac disease from pneumococcus infection,
Acute contagious conjunctivitis (rarer).

The bacteriological examination attendant upon the successful diagnosis of these cases may be said to be divided into two parts:

I. The examination of the smear.
II. The examination of the growths upon culture media.

The technique of the examination is very simple and con-

sists in the preparation of the smear in removing from the conjunctival sac a small amount of the discharge with a platinum wire which has previously been heated in the flame of an alcohol lamp or Bunsen burner, then cooled in the water of condensation of a sterilized tube, and spreading the discharge in a thin layer upon an ordinary microscope slide.

This layer is then fixed by gentle heating in the flame and a few drops of Lœffler's alkaline methylene blue poured upon the slide. It is again passed through the flame, washed off with water and dried slowly in the air or by warming.

That the smear is an important step will be readily appreciated by the statement of the fact that many cases of diphtheritic conjunctivitis (and from the experience of the last year and one quarter in the laboratory of the Massachusetts Charitable Eye and Ear Infirmary during the different services, notably that of Dr. Standish, over fifty per cent., approximately estimated, of all such cases) can be diagnosticated immediately, and the eighteen to twenty-four or more hours' delay attendant upon culture development obviated.

It is also possible to recognize in this manner every case of gonorrhœal conjunctivitis, although in these cases a second step is essential, which consists in bleaching the micro-organism with the Gram stain, as some intra-cellular diplococci are found resembling the gonococcus which are associated with conjunctivitis and with a marked discharge, and which on treating with the Gram stain do not bleach.

The results of repeated observations upon the characteristics of this organism warrant the statement that it is the micrococcus subflavus with which one has to do.

That the early diagnosis by means of the smear is a boon to the physician who possesses an oil immersion lens, is apparent.

The second part of the bacteriological procedure in purulent conjunctivitis consists in the examination of the growths obtained by the inoculation of the different culture media from the conjunctival sac discharge.

In the consideration of the bacteriological appearances in these conditions, it would be better to confine the description to the appearances in the smears, as the recognition of the colonies on the culture media, and the demonstration of the bacteria from the culture tubes on the slide or cover glass, is a simpler matter than the demonstration of the organism in the smear. Incidentally it may be said that during the course of this investigation a large number of cultures were made from the conjunctival sacs of healthy individuals who exhibited no ocular trouble, and although a number of articles have been published, especially in the German journals, to the effect that all healthy conjunctival sacs contain bacteria, the experience here showed that in a large number of cases (in some series 50% or more) the tubes showed absolutely no growth, the culture media used being, for the most part, blood serum, and occasionally gelatine and agar-agar.

In the order of importance from the prognostic standpoint, diphtheritic conjunctivitis is entitled to first consideration. Proceeding as described, a piece of the membrane or a slight amount of the discharge is transferred to the slide and stained. With the aid of an oil immersion lens are made out the brightly stained nuclei of the leucocytes, the fibrine strings and meshes and clumps of conjunctival epithelium.

In the fibrine meshes and in the conjunctival cell clumps are for the most part the bacilli, lying in groups, oftentimes of eight or ten, and exhibiting the typical characteristics of club-shaped ends, and clear unstained spaces in the rod. In marked cases the membrane may be stripped off and sections made with a freezing microtome. These sections

are stained with Gram's stain for bacteria in tissues, and show the bacilli lying along the edges of the membrane in large quantities.

Membrane formation of such size is, however, not the rule. The gray, thin membrane occurring in patches on the palpebral, and less often on the ocular conjunctiva, is the form of this disease that generally comes to the practitioner's notice. In such cases, if the sterilized platinum wire be rubbed along the surface of the false membrane, the typical picture may be obtained in the smear.

In this connection, it would be well to state that a small number of cases have been noticed associated with decided membrane formation, in which the staphylococcus aureus was found on repeatedly taken cultures, and which in a few days cleared up wholly and without corneal involvement.

In considering the appearances in gonorrhœal ophthalmia, the smear alone is to be relied upon, as it is next to impossible and certainly impracticable to grow this organism upon the surfaces of the ordinary culture media. A small quantity of the discharge having been spread upon the slide, is first stained with alkaline methylene blue, and the presence of intra-cellular diplococci ascertained. Another such slide is stained with Gram's stain, which consists in first coloring with aniline oil water gentian violet, washing with water, and then treating with the iodine, potass. iodide solution of Gram, again washing with water, finally with alcohol, and drying.

Under such treatment the cells lose somewhat of their sharp outline, but the principal change is in the organism; the dark-colored diplococcus losing its intensity, is seen as a bleached, oftentimes rose-colored, organism, within the cell outlines, and characteristically grouped. The degree of the bleaching of the gonococci is in a direct proportion to the length of time that the bleaching reagent is allowed to remain upon the slide, and may be carried so far as to

render the diplococci nearly invisible. It is often possible in this manner to demonstrate the invasion of the large hexagonal and becher cells of the conjunctiva by this organism.

A specific infection of the conjunctiva by the pneumococcus sometimes followed by corneal complications seems to be, from the number of cases seen, well established. Under such circumstances the discharge is thin, and may or may not be profuse. Generally it is poor in cellular elements, and shows here and there in the smear single pneumococci. The cultures from such eyes show small pneumococcus growths.

In those forms of pneumococcus infection associated with tear duct disease in young children, both the clinical and microscopical pictures are striking. In many of these cases it is impossible to tell clinically in such children whether we have to do with a gonococcus or pneumococcus infection.

The microscopical pictures presented by smears, however, are widely different. Here the pneumococci are found in large numbers, the discharge is profuse and containing fibrine-like strings. The appearances are enhanced by a capsule stain, and exhibit a different microscopical picture from that offered by the pneumococcus infection in the adult. In the cultures, large growths of pneumococcus are formed almost to the exclusion of other organisms.

Regarding the microscopical observations in acute contagious conjunctivitis, there is at present some doubt. Dr. Weeks, of New York, claims a specific bacillus in the bacterium bearing his name. He postulates that it is to be found in every case of this disease. The experience in the bacteriological laboratory of the Massachusetts Charitable Eye and Ear Infirmary does not bear out this assumption. In some few cases the organism that he describes has been found, exhibiting upon culture media the same biological characteristics, and in the smear being identical with those

in smears made by Dr. Weeks himself, and kindly lent by Dr. Standish.

The vast majority of all such cases, however, show the commoner pyogenic organisms both in the smear and growth, viz: the staphylococci, streptococcus, and in some few other cases the bacillus xerosis and the bacillus pyocyaneous.

The object of this communication is principally to call attention to the fact that in those cases of contagious conjunctivitis where the clinical diagnosis in the beginning is difficult or impossible, the possessor of a good microscope may ascertain the infection with which he has to deal, thus promoting early treatment, and using the cultures as a means of control.